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CRUDE ASSAY REPORT

Report Number: **IDL-CA-0003-2024_rev3**

SAMPLE DESCRIPTION: **Ravva Crude Oil sample**



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LABORATORY REPORT NO: IDL-CA-0003-2024 rev3

Date: February 29, 2024

Company details : Petrofac Engineering India Pvt. Ltd.
For the Attention of : Mr. Dattaji Galande
Sample(s) received from : Vedanta
Sample(s) submitted as : Crude Oil
Description(s) on Label(s) : Ravva Crude Oil sample
Seals on Sample(s) : None
Sample(s) received on : 8 January, 2024

The above sample(s) was/were examined and the following results obtained:

Please refer attached sheets for analysis report.

REPORTED BY

Rejeesh Reghu

Sr. Chemist

AUTHORIZED
SIGNATURE

Biju GEORGE

Assay Project Manager



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Ravva Crude

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TRUE BOILING POINT DISTILLATION DATA

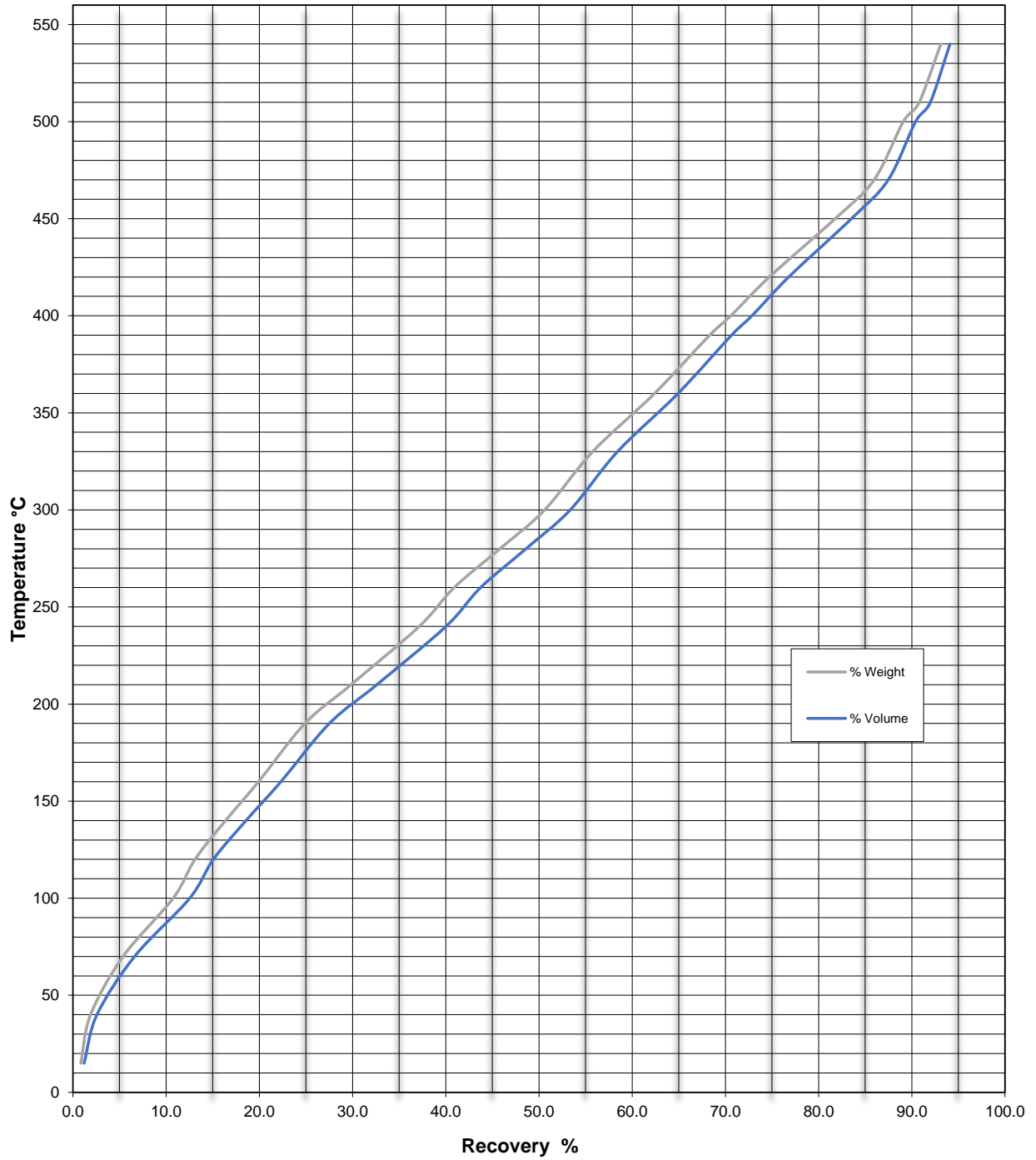
(ASTM D2892 & ASTM D5236)

Sample Descriptions / Label : Ravva Crude Oil sample

Sl. No.	Cut Points (AET) (° C)	Atmospheric Vapour Temperature (° C)	% Weight			Density at 15° C (kg/L)	% Volume		
			Cut	Cumulative	Mid		Cut	Cumulative	Mid
1	C5	15	0.84	0.84	0.42	0.5912	1.20	1.20	0.60
2	15 - 40	40	1.05	1.89	1.37	0.6402	1.38	2.58	1.89
3	40 - 70	70	3.48	5.38	3.64	0.7254	4.04	6.62	4.60
4	70 - 100	100	5.37	10.75	8.06	0.7627	5.92	12.53	9.57
5	100 - 120	120	2.35	13.10	11.92	0.7800	2.53	15.06	13.80
6	120 - 140	140	3.28	16.38	14.74	0.7852	3.51	18.57	16.82
7	140 - 160	160	3.54	19.91	18.14	0.7947	3.74	22.31	20.44
8	160 - 190	190	4.98	24.89	22.40	0.8045	5.20	27.51	24.91
9	190 - 210	210	4.95	29.84	27.37	0.8156	5.10	32.61	30.06
10	210 - 240	240	7.32	37.16	33.50	0.8297	7.41	40.02	36.32
11	240 - 260	260	3.74	40.90	39.03	0.8469	3.72	43.74	41.88
12	260 - 280	280	4.91	45.81	43.36	0.8476	4.87	48.61	46.17
13	280 - 300	300	4.80	50.61	48.21	0.8497	4.75	53.35	50.98
14	300 - 330	330	5.15	55.76	53.19	0.8526	5.07	58.43	55.89
15	330 - 360	360	6.64	62.40	59.08	0.8591	6.50	64.93	61.68
16	360 - 390	390	5.91	68.31	65.36	0.8661	5.73	70.66	67.79
17	390 - 400	400	2.28	70.59	69.45	0.8732	2.19	72.85	71.76
18	400 - 420	420	4.13	74.72	72.65	0.8787	3.95	76.80	74.83
19	420 - 450	450	7.06	81.78	78.25	0.8827	6.72	83.52	80.16
20	450 - 470	470	4.18	85.96	83.87	0.8897	3.95	87.47	85.50
21	475 - 500	500	3.13	89.09	87.53	0.8964	2.93	90.41	88.94
22	500 - 510	510	1.71	90.81	89.95	0.9070	1.59	92.00	91.20
23	510 - 540	540	2.32	93.12	91.96	0.9231	2.11	94.10	93.05
24	540 +	540 +	6.88	100.00	96.56	0.9804	5.90	100.00	97.05
25	330 +	> 330	44.24	100.00	-	0.8958	41.57	100.00	-
26	360 +	> 360	37.60	100.00	-	0.9023	35.07	100.00	-
27	400 +	> 400	29.41	100.00	-	0.9119	27.15	100.00	-
28	540 +	> 540	6.88	100.00	-	0.9804	5.90	100.00	-

TRUE BOILING POINT DISTILLATION CURVE

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SUMMARY OF PRODUCT / RESIDUE CUT POINTS AND YIELDS

Sample Descriptions:

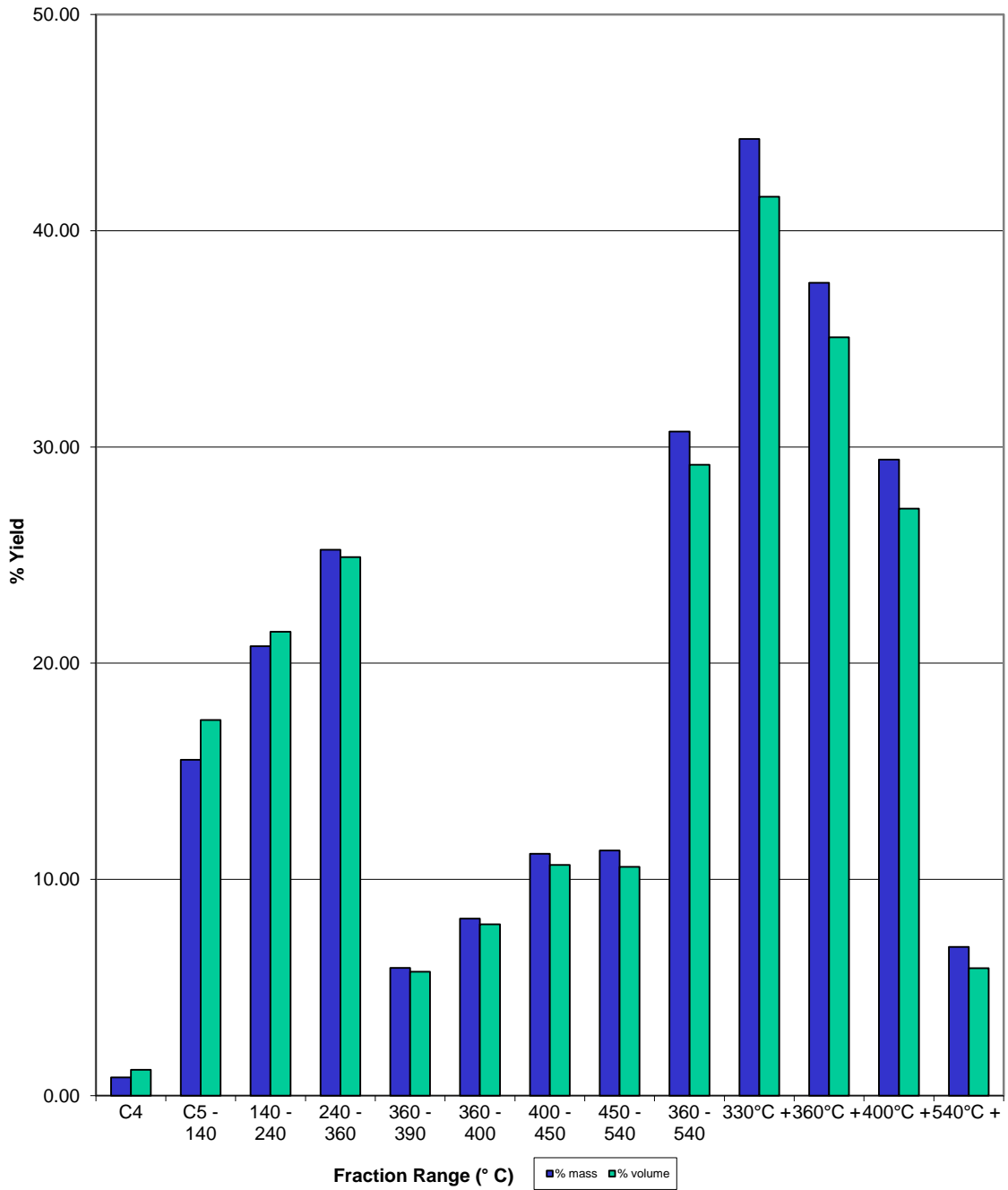
Ravva Crude Oil sample

Cut Points		Yield %	
(°C)		% mass	% volume
Gas - LPG	C4	0.84	1.20
Naphtha Fraction	C5 - 140	15.53	17.37
Kerosene Fraction	140 - 240	20.78	21.45
Atm. Gas Oil Fraction	240 - 360	25.24	24.90
Atm. Gas Oil Fraction	360 - 390	5.91	5.73
Atm. Gas Oil Fraction	360 - 400	8.18	7.92
Vacuum Gas Oil Fraction	400 - 450	11.19	10.67
Vacuum Gas Oil Fraction	450 - 540	11.34	10.58
Vacuum Gas Oil Fraction	360 - 540	30.72	29.18
Atm. Residue	330°C +	44.24	41.57
Atm. Residue	360°C +	37.60	35.07
Atm. Residue	400°C +	29.41	27.15
Vacuum Residue	540°C +	6.88	5.90



SUMMARY OF TRUE BOILING POINT DISTILLATION WIDE CUTS

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WHOLE CRUDE PROPERTIES

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Density @ 15°C (59°F)	ASTM D5002	kg/L	0.8412
Density @ 15.6°C (60°F)	ASTM D5002	kg/L	0.8408
Specific Gravity @ 60/60°F	Conversion		0.8416
API Gravity @ 60°F	Calculated	° API	36.63
Ash Content	ASTM D482	% Wt.	0.01
Asphaltene Content	IP 143	% Wt.	0.34
Carbon Residue	ASTM D189	% Wt.	0.67
Cold Finger Plugging Point	IP 309	°C	#
Flash Point (Abel)	IP 170	°C	24 [#]
Hydrogen Sulphide Content	UOP 163	ppm Wt.	<1
Hydrocarbon Composition	GC	% mol	Page No: 10
Kinematic Viscosity @ 40°C	ASTM D445	cSt	4.170
Kinematic Viscosity @ 50°C	ASTM D445	cSt	3.063
Kinematic Viscosity @ 100°C	ASTM D445	cSt	1.452
Viscosity-Gravity Constant @ 100°C	ASTM D2501	-	0.824
UOP K - Factor	UOP 375	calc.	11.94
Mercaptan Sulphur	ASTM D3227	ppm Wt.	<1
Mercury content	UOP 938	ppm Wt.	<1
Copper	IP 501	mg/kg	<1
Iron			2
Nickel			1
Sodium			12
Vanadium			<1
Molecular Weight	GC	-	288.5
Organic Chloride	ASTM D4929B	ppm Wt.	<1
Pour Point	ASTM D97	°C	+30
Wax Appearance Temperature (WAT)	IP 389A	°C	31.1
Wax Disappearance Temperature (WDT)	IP 389A	°C	36.2
Reid Vapour Pressure	ASTM D323	kPa	<1
Salt in Crude	ASTM D3230	PTB	14
SARA	IP 469	% Wt.	-
Saturates			65.9
Aromatics			27.7
Resins			5.8
Asphaltenes			0.6
Sediment By Extraction	ASTM D473	% Wt.	0.015
Sulphur Content	ASTM D4294	% Wt.	0.048
Total Acid Number	ASTM D664	mgKOH/g	0.43
Total Nitrogen	ASTM D5762	ppm Wt.	385
Basic Nitrogen	UOP 269	ppm Wt.	152
Water Content	ASTM D95	% Vol.	0.3
Wax Content	UOP 46	% Wt.	9.8

Note: Please note that the marked (#) results are unable to perform due to nature of the sample/ at room temperature the sample was not flowing.



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Light Hydrocarbons (Whole Crude Oil)

Sample Descriptions: Ravva Crude Oil sample

Light Hydrocarbons (Whole Crude Oil)			
TEST	METHOD	UNIT	RESULT
C2 minus	GC	% Wt.	< 0.01
C3	GC	% Wt.	0.030
iso-C4	GC	% Wt.	0.100
n-C4	GC	% Wt.	0.160
neo-C5	GC	% Wt.	0.020
iso-C5	GC	% Wt.	0.200
n-C5	GC	% Wt.	0.250
M-cyclo-5 (MCP)	GC	% Wt.	1.050
Benzene	GC	% Wt.	0.520
Cyclo-C6	GC	% Wt.	2.330
C6 Paraffins	GC	% Wt.	2.310



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SUMMARY OF WHOLE CRUDE COMPOSITION

Sample Descriptions / Label : Ravva Crude Oil sample

Component	Mole %	Weight %	Density g/cc (g/cc @ 60°F)	MW (g/mole)
Hydrogen	< 0.01	< 0.01	0.020	2.02
Hydrogen Sulphide	< 0.01	< 0.01	0.8006	34.08
Carbon Dioxide	< 0.01	< 0.01	0.8712	44.01
Nitrogen	< 0.01	< 0.01	0.8086	28.01
Methane	< 0.01	< 0.01	0.2997	16.04
Ethane	< 0.01	< 0.01	0.3558	30.07
Propane	0.01	0.03	0.5065	44.10
iso-Butane	0.03	0.10	0.5623	58.12
n-Butane	0.05	0.16	0.5834	58.12
iso-Pentane	0.07	0.20	0.6241	72.15
n-Pentane	0.09	0.25	0.6305	72.15
Hexane	0.98	2.31	0.6632	86.18
Methyl cyclopentane	0.43	1.05	0.7533	84.16
Benzene	0.22	0.52	0.8820	78.11
Cyclohexane	0.97	2.33	0.7827	84.16
Heptane	3.42	6.94	0.6874	100.21
Methyl cyclohexane	1.73	3.59	0.7740	98.19
Toluene	0.66	1.45	0.8734	92.14
Octane	3.24	5.76	0.7061	114.23
Ethyl Benzene	0.07	0.13	0.8735	106.17
meta & para Xylene	0.78	1.49	0.8671	106.17
ortho Xylene	0.01	0.02	0.8840	106.17
Nonanes	2.95	4.67	0.7212	128.26
Decanes	2.84	4.05	0.7343	142.29
Undecanes	2.99	3.89	0.7444	156.00
Dodecanes	3.87	4.62	0.7529	170.30
Tridecanes	5.09	5.61	0.7606	184.37
Tetradecanes	4.78	4.90	0.7669	198.40
Pentadecanes	3.74	3.58	0.7726	212.42
Hexadecanes	5.03	4.51	0.7774	226.45
Heptadecanes	3.67	3.10	0.7821	240.48
Octadecanes	3.47	2.77	0.7860	254.50
Nonadecanes	3.45	2.61	0.7895	268.53
Eicosanes	3.48	2.50	0.7926	282.56
Heneicosanes	3.66	2.51	0.7957	296.58
Docasanes	3.62	2.37	0.7984	310.61
Tricosanes	3.61	2.26	0.8001	324.63
Tetracosanes	4.07	2.44	0.8030	338.67
Pentacosanes	4.17	2.40	0.8053	352.69
Hexacosanes	4.58	2.54	0.8071	366.72
Heptacosanes	4.70	2.51	0.8089	380.75
Octacosanes	4.47	2.30	0.8106	394.77
Nonacosanes	3.88	1.93	0.8122	408.80
Triacontanes	3.50	1.68	0.8128	422.80
Triacontanes Plus	1.63	3.94	2.6958	997.62
Totals	100.00	100.00		
Residue Totals	Mole %	Weight %	Density g/cc (g/cc @ 60°F)	MW (g/mole)
Heptanes plus	97.16	93.05	0.798	270
Undecanes plus	81.47	64.97	0.854	298
Eicosanes plus	45.38	29.38	0.990	356
Triacontanes plus	1.63	3.94	2.696	998
Average Molecular Weight of sample (g/mole)			414	
Density of Sample @ 60°F (kg/L)			0.8408	
Water Content (% Weight)			0.30	



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C4 Light Ends (LPG) Properties

Sample Descriptions: Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	0.84
Yield		% Vol.	1.20
Density @ 15°C (59°F)	ASTM D5002	kg/L	0.5912
Density @ 15.6°C (60°F)	ASTM D5002	kg/L	0.5906
Specific Gravity @ 60/60°F	Conversion	-	0.5912
API Gravity @ 60°F	Calculated	° API	107.8
Hydrocarbons Composition			
Methane	GC	mol%	0.0
Ethane	GC	mol%	3.291
Propane	GC	mol%	55.111
i-Butane	GC	mol%	17.261
n-Butane	GC	mol%	23.716
i-Pentane	GC	mol%	0.387
neo-Pentane	GC	mol%	0.015
n-Pentane	GC	mol%	0.048
Hexanes	GC	mol%	0.0

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Naphtha Fraction- [C5-140°C]

Sample Descriptions: Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	15.53
Yield		% Vol.	17.37
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.7596
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.7596
Specific Gravity @ 60/60°F	Conversion		0.7599
API Gravity @ 60°F	Calculated	° API	54.71
FIA - Aromatics	ASTM D1319	% Vol.	16.9
FIA - Olefins	ASTM D1319	% Vol.	0.6
FIA - Saturates	ASTM D1319	% Vol.	82.5
Research Octane Number	ASTM D2699	-	71.1
Motor Octane Number	ASTM D2700	-	65.8
Antiknock Index (AKI)	ASTM D4814	calc.	68.5
Organic Chloride	ASTM D4929B	ppm Wt.	<1
Reid Vapour Pressure	ASTM D323	kPa	23.3
Smoke Point	ASTM D1322	mm	27
Sulphur Content	ASTM D4294	% Wt.	0.002
Sulphur as Mercaptans	ASTM D3227	ppm Wt.	<3
Distillation	ASTM D86	°C	Page No: 22
Total Nitrogen	ASTM D4629	ppm Wt.	<1
Total Paraffins	ASTM D6730	% Vol.	42.362
Total Olefins			0.702
Total Naphthenes			39.364
Total Aromatics			17.572
Total Unidentified			<0.1

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Kerosene Fraction- [140-240°C]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	20.78
Yield		% Vol.	21.45
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.8249
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.8245
Specific Gravity @ 60/60°F	Conversion		0.8253
API Gravity @ 60°F	Calculated	° API	39.95
Carbon Content	ASTM D5291	% Wt.	86.3
Hydrogen Content	ASTM D5291	% Wt.	13.6
Calculated Cetane Index	ASTM D976	-	40.0
Copper Corrosion @ 100°C, 2 hours	ASTM D130	-	1a
FIA - Aromatics	ASTM D1319	% Vol.	21.5
FIA - Olefins	ASTM D1319	% Vol.	0.5
FIA - Saturates	ASTM D1319	% Vol.	77.9
Freezing Point	ASTM D2386	°C	-47
Kinematic Viscosity @ -20°C	ASTM D445	cSt	5.328
Kinematic Viscosity @ 20°C	ASTM D445	cSt	1.969
Kinematic Viscosity @ 40°C	ASTM D445	cSt	1.380
Kinematic Viscosity @ 50°C	ASTM D445	cSt	1.180
Kinematic Viscosity @ 70°C	ASTM D445	cSt	0.910
Naphthalene Content	ASTM D1840	% Vol.	1.14
Refractive Index @ 70°C	ASTM D1218	-	1.4584
Saybolt Colour	ASTM D156	-	+25
Smoke Point	ASTM D1322	mm	22.0
Sulphur Content	ASTM D4294	% Wt.	0.021
Sulphur as Mercaptans	ASTM D3227	ppm Wt.	<3
Distillation	ASTM D86	°C	Page No: 22
Flash Point	ASTM D93	°C	66.0
Flash Point	IP 170	°C	64.5
Total Acid Number	ASTM D664	mgKOH/g	0.020
Total Nitrogen	ASTM D4629	ppm Wt.	4.3



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Atm. Gas Oil Fraction- [240-360°C]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	25.24
Yield		% Vol.	24.90
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.8550
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.8546
Specific Gravity @ 60/60°F	Conversion		0.8555
API Gravity @ 60°F	Calculated	° API	33.90
ASTM Colour	ASTM D1500	-	L1.5
Aniline Point	ASTM D611	°C	74.0
Calculated Cetane Index	ASTM D976	-	50.7
Cetane Number	ASTM D613	-	48.8
Cloud Point	ASTM D2500	°C	+11
Copper Corrosion @ 50°C, 3 hours	ASTM D130	-	1a
Flash Point	ASTM D93	°C	126
Flash Point (Abel)	IP 170	°C	>66.5
Kinematic Viscosity @ 40°C	ASTM D445	cSt	4.335
Kinematic Viscosity @ 50°C	ASTM D445	cSt	3.589
Kinematic Viscosity @ 70°C	ASTM D445	cSt	2.566
Viscosity-Gravity Constant @ 40°C	ASTM D2501	-	0.881
Pour Point	ASTM D97	°C	+6
Ramsbottom Carbon Residue 10 % Bottom	ASTM D524	% Wt.	0.06
Refractive Index @ 70°C	ASTM D1218	-	1.4557
Sulphur Content	ASTM D4294	% Wt.	0.037
Distillation	ASTM D86	°C	Page No: 22
Total Nitrogen	ASTM D4629	ppm Wt.	108
Basic Nitrogen	UOP 269	ppm Wt.	28



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Atm. Gas Oil Fraction- [360-390°C]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	5.91
Yield		% Vol.	5.73
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.8706
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.8702
Specific Gravity @ 60/60°F	Conversion		0.8711
API Gravity @ 60°F	Calculated	° API	30.94
ASTM Colour	ASTM D1500	-	1.5
Aniline Point	ASTM D611	°C	78.3
Calculated Cetane Index	ASTM D4737	-	53.1
Cetane Number	ASTM D613	-	51.7
Cloud Point	ASTM D2500	°C	+21
Copper Corrosion @ 50°C, 3 hours	ASTM D130	-	1a
Flash Point	ASTM D93	°C	146.0
Flash Point (Abel)	IP 170	°C	>66.5
Kinematic Viscosity @ 40°C	ASTM D445	cSt	12.67
Kinematic Viscosity @ 50°C	ASTM D445	cSt	9.182
Kinematic Viscosity @ 70°C	ASTM D445	cSt	5.215
Viscosity-Gravity Constant @ 40°C	ASTM D2501	-	0.838
Pour Point	ASTM D97	°C	+18
Ramsbottom Carbon Residue 10 % Bottom	ASTM D524	% Wt.	<0.1
Refractive Index @ 70°C	ASTM D1218	-	1.4578
Sulphur Content	ASTM D4294	% Wt.	0.042
Distillation	ASTM D86	°C	**
Total Nitrogen	ASTM D5762	ppm Wt.	199
Basic Nitrogen	UOP 269	ppm Wt.	61



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Atm. Gas Oil Fraction- [360-400°C]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	8.18
Yield		% Vol.	7.92
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.8711
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.8707
Specific Gravity @ 60/60°F	Conversion		0.8716
API Gravity @ 60°F	Calculated	° API	30.85
Ash Content	ASTM D482	% Wt.	<0.01
Asphaltene Content	IP 143	% Wt.	<0.5
ASTM Colour	ASTM D1500	-	2.0
Carbon Content	ASTM D5291	% Wt.	86.9
Hydrogen Content	ASTM D5291	% Wt.	13.0
Carbon Residue	ASTM D189	% Wt.	<0.1
Cloud Point	ASTM D2500	°C	+33
Kinematic Viscosity @ 50°C	ASTM D445	cSt	9.818
Kinematic Viscosity @ 70°C	ASTM D445	cSt	6.042
Kinematic Viscosity @ 100°C	ASTM D445	cSt	3.378
Viscosity-Gravity Constant @ 100°C	ASTM D2501	-	0.827
Metal Content	IP 501	mg/kg	-
Copper	IP 501	mg/kg	<1
Iron	IP 501	mg/kg	<1
Nickel	IP 501	mg/kg	<1
Sodium	IP 501	mg/kg	<1
Vanadium	IP 501	mg/kg	<1
Pour Point	ASTM D97	°C	+30
Refractive Index @ 70°C	ASTM D1218	-	1.4670
Sulphur Content	ASTM D4294	% Wt.	0.045
Total Acid Number	ASTM D664	mgKOH/g	0.65
Total Nitrogen	ASTM D4629	ppm Wt.	295
Wax Content	UOP 46	% Wt.	12.4



**BUREAU
VERITAS**

LABORATORY REPORT NO: IDL-CA-0003-2024_rev3

Vacuum Gas Oil Fraction- [400-450°C]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	11.19
Yield		% Vol.	10.67
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.8781
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.8777
Specific Gravity @ 60/60°F	Conversion		0.8786
API Gravity @ 60°F	Calculated	° API	29.55
Ash Content	ASTM D482	% Wt.	<0.01
Asphaltene Content	IP 143	% Wt.	<0.5
ASTM Colour	ASTM D1500	-	L2.5
Carbon Content	ASTM D5291	% Wt.	87.1
Hydrogen Content	ASTM D5291	% Wt.	12.8
Carbon Residue	ASTM D189	% Wt.	0.96
Cloud Point	ASTM D2500	°C	>+45
Kinematic Viscosity @ 50°C	ASTM D445	cSt	15.92
Kinematic Viscosity @ 70°C	ASTM D445	cSt	9.06
Kinematic Viscosity @ 100°C	ASTM D445	cSt	4.643
Viscosity-Gravity Constant @ 100°C	ASTM D2501	-	0.826
Metal Content	IP 501	mg/kg	-
Copper	IP 501	mg/kg	<1
Iron	IP 501	mg/kg	<1
Nickel	IP 501	mg/kg	<1
Sodium	IP 501	mg/kg	<1
Vanadium	IP 501	mg/kg	<1
Pour Point	ASTM D97	°C	+45
Refractive Index @ 70°C	ASTM D1218	-	1.4702
Sulphur Content	ASTM D4294	% Wt.	0.059
Total Acid Number	ASTM D664	mgKOH/g	0.71
Total Nitrogen	ASTM D5762	ppm Wt.	348
Wax Content	UOP 46	% Wt.	16.5



**BUREAU
VERITAS**

LABORATORY REPORT NO: IDL-CA-0003-2024_rev3

Vacuum Gas Oil Fraction- [450-540°C]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	11.34
Yield		% Vol.	10.58
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.8987
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.8983
Specific Gravity @ 60/60°F	Conversion		0.8992
API Gravity @ 60°F	Calculated	° API	25.86
Ash Content	ASTM D482	% Wt.	0.01
Asphaltene Content	IP 143	% Wt.	<0.5
ASTM Colour	ASTM D1500	-	L7.5
Carbon Content	ASTM D5291	% Wt.	87.3
Hydrogen Content	ASTM D5291	% Wt.	12.5
Carbon Residue	ASTM D189	% Wt.	1.23
Cloud Point	ASTM D2500	°C	> +45
Kinematic Viscosity @ 50°C	ASTM D445	cSt	44.15
Kinematic Viscosity @ 70°C	ASTM D445	cSt	20.88
Kinematic Viscosity @ 100°C	ASTM D445	cSt	9.179
Viscosity-Gravity Constant @ 100°C	ASTM D2501	-	0.833
Metal Content	IP 501	mg/kg	-
Copper	IP 501	mg/kg	<1
Iron	IP 501	mg/kg	<1
Nickel	IP 501	mg/kg	<1
Sodium	IP 501	mg/kg	<1
Vanadium	IP 501	mg/kg	<1
Pour Point	ASTM D97	°C	> +48
Refractive Index @ 70°C	ASTM D1218	-	1.4787
Sulphur Content	ASTM D4294	% Wt.	0.061
Total Acid Number	ASTM D664	mgKOH/g	0.84
Total Nitrogen	ASTM D5762	ppm Wt.	890
Wax Content	UOP 46	% Wt.	30.9



**BUREAU
VERITAS**

LABORATORY REPORT NO: IDL-CA-0003-2024_rev3

Atm. + Vacuum Gas Oil Fraction- [360-540°C]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	30.72
Yield		% Vol.	29.18
Density @ 15°C (59°F)	ASTM D4052	kg/L	0.8858
Density @ 15.6°C (60°F)	ASTM D4052	kg/L	0.8854
Specific Gravity @ 60/60°F	Conversion		0.8863
API Gravity @ 60°F	Calculated	° API	28.15
Ash Content	ASTM D482	% Wt.	0.01
Asphaltene Content	IP 143	% Wt.	<0.5
ASTM Colour	ASTM D1500	-	L5.5
Carbon Content	ASTM D5291	% Wt.	87.10
Hydrogen Content	ASTM D5291	% Wt.	12.7
Carbon Residue	ASTM D189	% Wt.	1.08
Cloud Point	ASTM D2500	°C	>+45
Kinematic Viscosity @ 50°C	ASTM D445	cSt	21.01
Kinematic Viscosity @ 70°C	ASTM D445	cSt	11.52
Kinematic Viscosity @ 100°C	ASTM D445	cSt	5.695
Viscosity-Gravity Constant @ 100°C	ASTM D2501	-	0.830
Metal Content	IP 501	mg/kg	-
Copper	IP 501	mg/kg	<1
Iron	IP 501	mg/kg	<1
Nickel	IP 501	mg/kg	<1
Sodium	IP 501	mg/kg	<1
Vanadium	IP 501	mg/kg	<1
Pour Point	ASTM D97	°C	+48
Refractive Index @ 70°C	ASTM D1218	-	1.4821
Sulphur Content	ASTM D4294	% Wt.	0.057
Total Acid Number	ASTM D664	mgKOH/g	0.90
Total Nitrogen	ASTM D4629	ppm Wt.	577
Wax Content	UOP 46	% Wt.	18.4

LABORATORY REPORT NO: IDL-CA-0003-2024_rev3

Atmospheric Residue- [360°C+]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	37.60
Yield		% Vol.	35.07
Density @ 15°C (59°F)	IP 365	kg/L	0.9036
Density @ 15.6°C (60°F)	IP 365	kg/L	0.9032
Specific Gravity @ 60/60°F	Conversion		0.9041
API Gravity @ 60°F	Calculated	° API	25.01
Ash Content	ASTM D482	% Wt.	0.02
Asphaltene Content	IP 143	% Wt.	0.90
Carbon Content	ASTM D5291	% Wt.	87.3
Hydrogen Content	ASTM D5291	% Wt.	12.4
Carbon Residue	ASTM D189	% Wt.	2.54
Gross Heating Value	ASTM D240	MJ/Kg	44.37
Kinematic Viscosity @ 70°C	ASTM D445	cSt	23.52
Kinematic Viscosity @ 100°C	ASTM D445	cSt	9.780
Viscosity-Gravity Constant @ 100°C	ASTM D2501	-	0.837
Copper	IP 501	mg/kg	<1
Iron	IP 501	mg/kg	5
Nickel	IP 501	mg/kg	3
Sodium	IP 501	mg/kg	74
Vanadium	IP 501	mg/kg	<1
Pour Point	ASTM D97	°C	> +48
Wax Appearance Temperature (WAT)	IP 389A	°C	52.0
Sulphur Content	ASTM D4294	% Wt.	0.091
Total Acid Number	ASTM D664	mgKOH/g	1.03
Total Nitrogen	ASTM D4629	ppm Wt.	948
Wax Content	UOP 46	% Wt.	25.2

LABORATORY REPORT NO: IDL-CA-0003-2024_rev3

Vacuum Residue - [540°C+]

Sample Descriptions:

Ravva Crude Oil sample

TEST	METHOD	UNIT	RESULT
Yield	ASTM D2892 / D5236	% Wt.	6.88
Yield		% Vol.	5.90
Density @ 15°C (59°F)	IP 365	kg/L	0.9801
Density @ 15.6°C (60°F)	IP 365	kg/L	0.9797
Specific Gravity @ 60/60°F	Conversion		0.9807
API Gravity @ 60°F	Calculated	° API	12.78
Ash Content	ASTM D482	% Wt.	0.03
Asphaltene Content	IP 143	% Wt.	4.93
Carbon Content	ASTM D5291	% Wt.	87.9
Hydrogen Content	ASTM D5291	% Wt.	11.6
Carbon Residue	ASTM D189	% Wt.	14.6
Gross Heating Value	ASTM D240	MJ/Kg	43.02
Kinematic Viscosity @ 70°C	ASTM D445	cSt	2055
Kinematic Viscosity @ 100°C	ASTM D445	cSt	296.2
Viscosity-Gravity Constant @ 100°C	ASTM D2501	-	0.851
Copper	IP 501	mg/kg	<1
Iron	IP 501	mg/kg	29
Nickel	IP 501	mg/kg	15
Sodium	IP 501	mg/kg	366
Vanadium	IP 501	mg/kg	<1
Pour Point	ASTM D97	°C	> +48
Wax Appearance Temperature (WAT)	IP 389A	°C	73.6
Sulphur Content	ASTM D4294	% Wt.	0.247
Total Acid Number	ASTM D664	mgKOH/g	2.01
Total Nitrogen	ASTM D5291	% Wt.	2800
Wax Content	UOP 46	% Wt.	33.5



**BUREAU
VERITAS**

LABORATORY REPORT NO: IDL-CA-0003-2024 rev3

ASTM 86 - DISTILLATION DATA

Sample Descriptions: Ravva Crude Oil sample

Boiling range	°C	C5-140°C	140-240°C	240-360°C	360-390°C
Initial boiling point	°C	52.5	141.7	241.3	**
10% recovered	°C	87.1	156.2	274.6	**
20% recovered	°C	95.7	157.3	279.5	**
30% recovered	°C	101.0	162.9	283.6	**
40% recovered	°C	104.7	170.2	288.8	**
50% recovered	°C	110.6	180.6	295.1	**
60% recovered	°C	115.3	189.3	303.3	**
70% recovered	°C	120.5	198.1	313.7	**
80% recovered	°C	124.5	208.0	326.7	**
90% recovered	°C	127.8	217.2	343.7	**
95% recovered	°C	132.1	228.5	355.1	**
Final Boiling Point	°C	140.6	239.8	360.8	**
Volume recovered	% Vol.	98.0	98.0	98.0	**
Residue	% Vol.	0.9	1.0	1.2	**
Loss	% Vol.	1.1	1.0	0.8	**

Note: Please note that the marked (**) results are unable to perform due to the heavy nature of the fraction